① Given $f(x) = \sec(x)$, find the linearization of $f(x)$ centered at $x=1$. How close to one do you have to stay to have an error of less than 0.001?

② Given $y = 12x + 5$, how much does y change when x changes by 2? 6? $\frac{1}{3}$? $\frac{1}{12}$?

slope $= 12$

$12 \cdot 2 = 24$

$f'(x) \cdot dx = dy$

$12 \cdot \frac{1}{12} = 1$

$f'(x)\, dx = dy$

2.882474696
1.850815718

1. $f(x) = \sec(x)$ $\quad \sec(1) = 1.8508$

$f'(x) = \dfrac{\sin x}{\cos^2 x}$

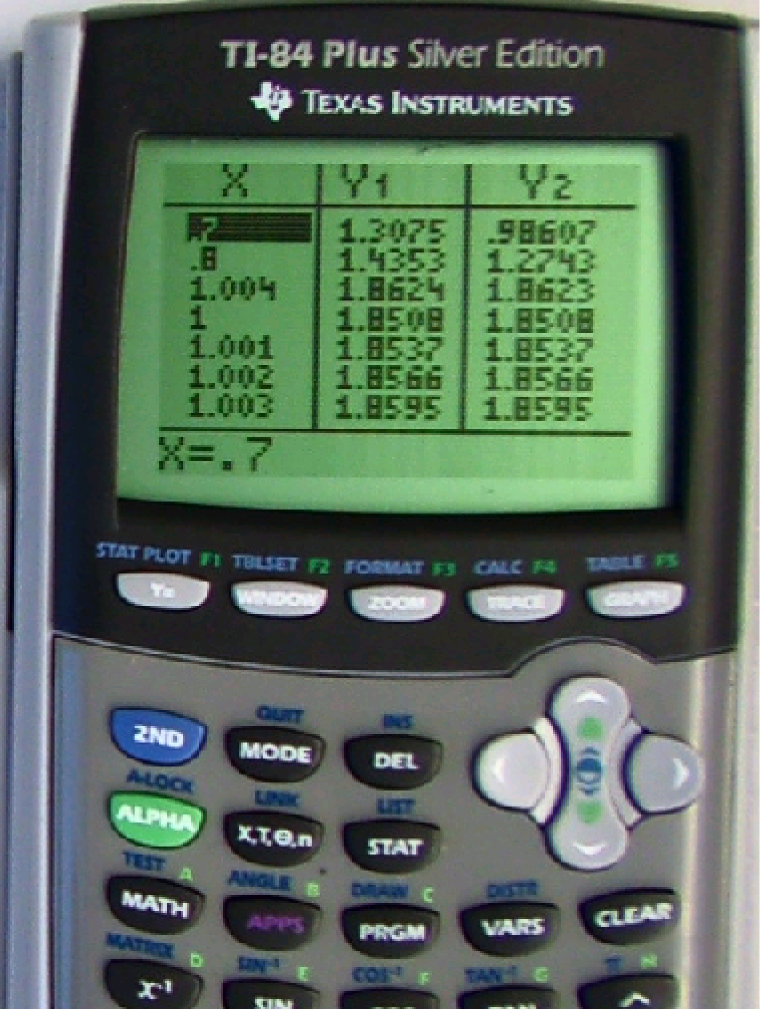
$f'(1) = \dfrac{\sin(1)}{\cos^2(1)} = 2.882$

$y = 2.882(x-1) + 1.8508$

error less than .001 within .004

2.

x changes by	y changes by
7	241
6	72
1/3	4
1/12	1



Differentials

- A differential is an infinitesimally small change in a variable.

$$x_2 - x_1 = \Delta x = \underset{\substack{\downarrow \\ \text{very} \\ \text{small}}}{dx} = \text{differential}$$

dy is a dependent variable, also an approximation from the linearization of the function $(y_2 - y_1)$

$$dy = f'(x)\,dx$$

$$L(x) = f(a) + f'(a)\underbrace{(x-a)}_{dx}$$

dy

Example

#35 in 4.5

$$V = \frac{4}{3}\pi r^3$$

$$dV = d\left(\frac{4}{3}\pi r^3\right)$$

$\rightarrow$ $dV = 4\pi r^2 dr$

$dV = 4\pi a^2 dr$

When $r = 10 \rightarrow 10.05$

$$dV = 4\pi(10)^2(0.05)$$

$$dV = 20\pi$$

Try #36

$S = 4\pi x^2$

$S = 4\pi a^2$

$dS = 8\pi a\,dr$

$dS = 8\pi(10)(.05)$

$dS = 4\pi$

Sect. 4.5

#20, 25, 26, 27, 31, 34, pick some from $\left\{ \right.$ 35-40, 42, 44, 46, 47, 51

JACKIE FUHRMAN
BLOCK #1

#27

$50 + x = \#$ of people

$x = \#$ of people over 50

Revenue: $(200 - 2x)(x + 50)$

$0 < x \leq 30$

Cost: $6000 + 32(x + 50)$

Profit = Revenue - Cost

$P = [(200 - 2x)(x + 50)] - [6000 + 32(x + 50)]$

$P = 200x + 10{,}000 - 2x^2 - 100x - 6000 - 32x - 1600$

$P = 2{,}400 + 68x - 2x^2$

$P = -2x^2 + 68x + 2{,}400$

$P' = -4x + 68$

$0 = -4x + 68$ *Set = to 0 since you're trying to find the max.

$-68 = -4x$

$x = 17$

$50 + x = \#$ of people

$50 + 17 = 67$